



IN THE CLAIMS

Claims 1-28. (Canceled).

29. (Currently Amended) A machine-implemented method, comprising: ~~for multiplying a matrix [A] by a matrix of inputs [X] to obtain a matrix of outputs [Y], the method comprising:~~

receiving a multimedia signal having data values;

forming the data values into a matrix of inputs [X];

forming a matrix [A] ~~as a matrix~~ of predetermined values and multiplication operations; wherein the multiplication operations are selectively positioned into pairs within [A] to reduce the number of the multiplication operations upon factorization of [A];

factoring [A] into a butterfly matrix [B], a shuffle matrix [S], and a multiplication matrix [M], wherein the multiplication operations are selectively positioned into pairs within [M];

and

~~grouping a set of values together within [M] for simultaneous execution by a processor instruction;~~

simultaneously executing multiplication operations on the grouped set of values using a Single Instruction Multiple Data (SIMD) instruction that multiplies [X], [B], [S], and [M] together to obtain a matrix of outputs [Y].

30. (Previously Presented) The machine-implemented method of claim 29, wherein the SIMD instruction is a Packed Multiply and Add (PMADDWD) instruction.

31. (Previously Presented) The machine-implemented method of 30, wherein values within [B] and [S] are integers selected from the group consisting of 1, 0 and -1.

32. (Previously Presented) The machine-implemented method of claim 31, wherein [A] is a 4-point Discrete Cosine Transform (DCT) transformation matrix, [X] represents a time domain of a video signal, and [Y] represents a frequency domain of the video signal.

33. (Previously Presented) The machine-implemented method of claim 32, wherein the multiplication matrix [M] is

$$\begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 & 0 \\ 0 & 0 & \cos(\frac{3\pi}{8}) & \cos(\frac{\pi}{8}) \\ 0 & 0 & -\cos(\frac{\pi}{8}) & \cos(\frac{3\pi}{8}) \end{bmatrix},$$

and wherein the ~~grouped set of values~~ **positioned pairs** are  $\frac{1}{\sqrt{2}}$  and  $\frac{1}{\sqrt{2}}$  and  $\frac{1}{\sqrt{2}}$  and  $-\frac{1}{\sqrt{2}}$ .

34. (Previously Presented) A machine-readable medium having instructions to cause a machine to perform a machine-implemented method, ~~for multiplying a matrix [A] by a matrix of inputs [X] to obtain a matrix of outputs [Y], the method comprising:~~

**receiving a multimedia signal having data values;**

**forming the data values into a matrix of inputs [X];**

forming **a matrix [A]** ~~as a matrix of predetermined values and multiplication operations, wherein the multiplication operations are selectively positioned into pairs within [A] to reduce the number of the multiplication operations upon factorization of [A];~~

factoring [A] into a butterfly matrix [B], a shuffle matrix [S], and a multiplication matrix [M], **wherein the multiplication operations are selectively positioned into pairs within [M];**  
**and**

~~grouping a set of values together within [M] for simultaneous execution by a processor instruction;~~

~~simultaneously executing multiplication operations on the grouped set of values using a Single Instruction Multiple Data (SIMD) instruction~~ **that multiplies [X], [B], [S], and [M] together to obtain a matrix of outputs [Y].**

35. (Previously Presented) The machine-readable medium of claim 34, wherein the SIMD instruction is a Packed Multiply and Add (PMADDWD) instruction.

36. (Previously Presented) The machine-readable medium of claim 35, wherein values within [B] and [S] are integers selected from the group consisting of 1, 0 and -1.

37. (Previously Presented) The machine-readable medium of claim 36, wherein [A] is a 4-point Discrete Cosine Transform (DCT) transformation matrix, [X] represents a time domain of a video signal, and [Y] represents a frequency domain of the video signal.

38. (Previously Presented) The machine-readable medium of claim 37, wherein the multiplication matrix [M] is

$$\begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 & 0 \\ 0 & 0 & \cos(\frac{3\pi}{8}) & \cos(\frac{\pi}{8}) \\ 0 & 0 & -\cos(\frac{\pi}{8}) & \cos(\frac{3\pi}{8}) \end{bmatrix},$$

and wherein the ~~grouped set of values~~ **positioned pairs** are  $\frac{1}{\sqrt{2}}$  and  $\frac{1}{\sqrt{2}}$  and  $\frac{1}{\sqrt{2}}$  and  $-\frac{1}{\sqrt{2}}$ .

39. (Previously Presented) A system comprising:

a processing unit coupled to a memory through a bus; and

a process ~~for multiplying a matrix [A] by a matrix of inputs [X] to obtain a matrix of outputs [Y], the process~~ executed from the memory by the processing unit to cause the processing unit to:

**receive a multimedia signal having data values;**

**form the data values into a matrix of inputs [X];**

form **a matrix [A]** ~~as a matrix~~ of predetermined values and multiplication operations; ~~wherein the multiplication operations are selectively positioned into pairs within [A] to reduce the number of the multiplication operations upon factorization of [A];~~

factor [A] into a butterfly matrix [B], a shuffle matrix [S], and a multiplication matrix [M], **wherein the multiplication operations are selectively positioned into pairs within [M];**  
**and**

~~group a set of values together within [M] for simultaneous execution by a processor instruction;~~  
simultaneously execute multiplication operations on the grouped set of values using a Single Instruction Multiple Data (SIMD) instruction **that multiplies [X], [B], [S], and [M] together to obtain a matrix of outputs [Y].**

40. (Previously Presented) The system of claim 39, wherein the SIMD instruction is a Packed Multiply and Add (PMADDWD) instruction.

41. (Previously Presented) The system of claim 40, wherein values within [B] and [S] are integers selected from the group consisting of 1, 0 and -1.

42. (Previously Presented) The system of claim 41, wherein [A] is a 4-point Discrete Cosine Transform (DCT) transformation matrix, [X] represents a time domain of a video signal, and [Y] represents a frequency domain of the video signal.

43. (Previously Presented) The system of claim 42, wherein the multiplication matrix [M] is

$$\begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 & 0 \\ 0 & 0 & \cos(\frac{3\pi}{8}) & \cos(\frac{\pi}{8}) \\ 0 & 0 & -\cos(\frac{\pi}{8}) & \cos(\frac{3\pi}{8}) \end{bmatrix},$$

and wherein the ~~grouped set of values~~ **positioned pairs** are  $\frac{1}{\sqrt{2}}$  and  $\frac{1}{\sqrt{2}}$  .  
 $\frac{1}{\sqrt{2}}$   $-\frac{1}{\sqrt{2}}$